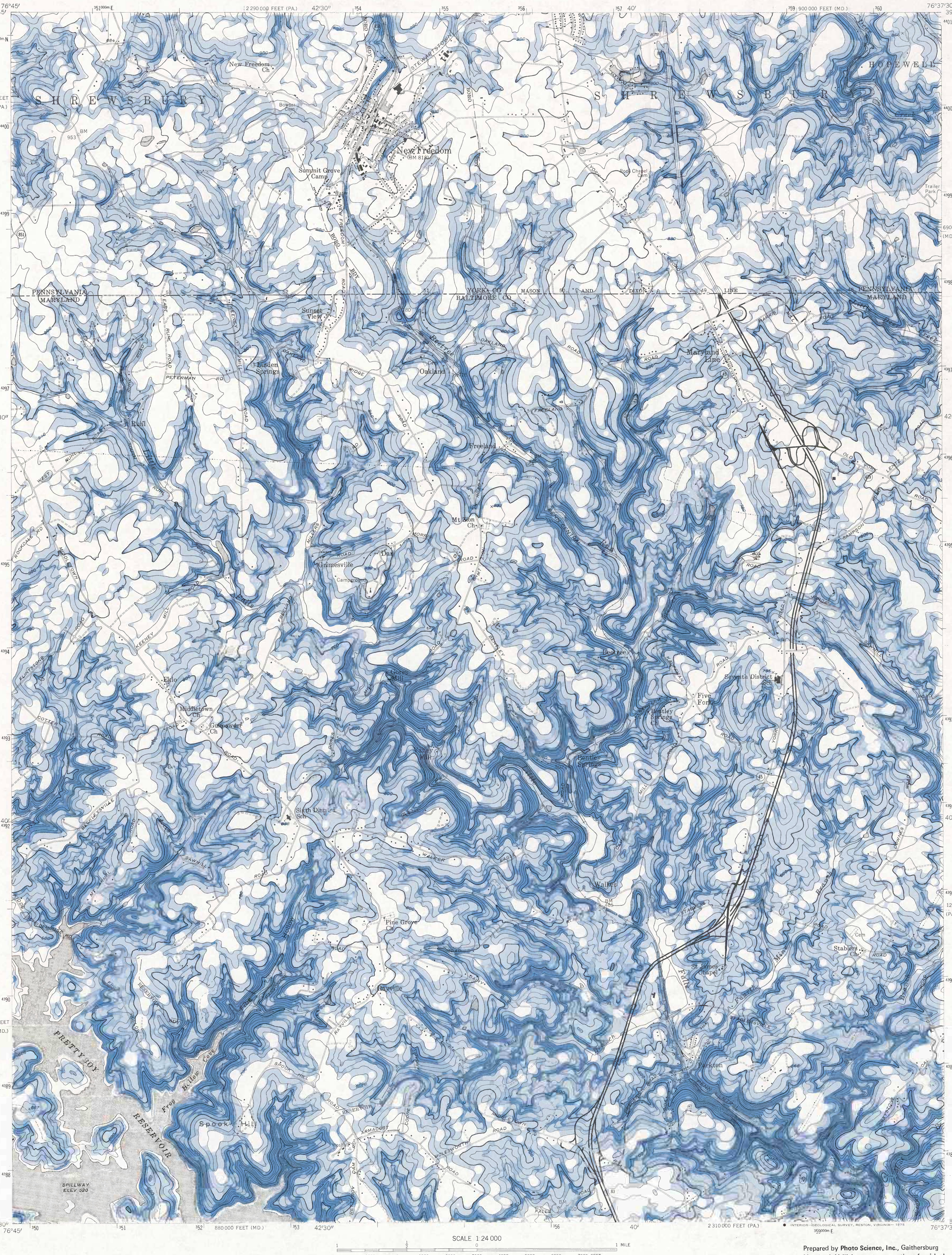
Prepared in cooperation with the
United States Geological Survey
and the
Baltimore County Department of
Planning and Zoning.

MAP 1. SLOPE OF LAND SURFACE

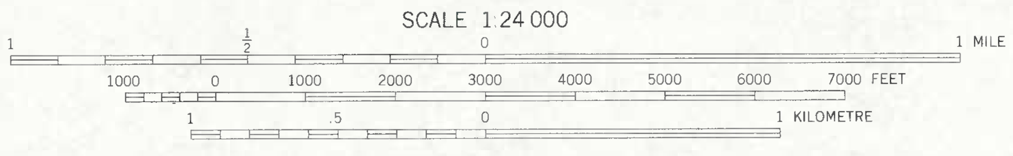
Quadrangle Atlas No. 20



EXPLANATION

This map shows the slope of the land surface in the New Freedom quadrangle, with the slope values grouped into categories. The map was prepared from a 1:24,000-scale topographic contour plate using a semi-automatic photomechanical process. In this process, a device measures the distance between adjacent lines and, for the contour interval provided, calculates the slope between the lines. Narrow summits or depressions and similar features may be falsely mapped due to the bending of a line upon itself. Likewise, equal but adjacent contours produce over-estimated slopes. Widely separated contour lines may result in an averaging of the intervening slopes. These limitations are only of small extent. The slope categories, which relate to those in the Baltimore County Soil Survey, were selected for their relevance to current and contemplated Baltimore County planning regulations.

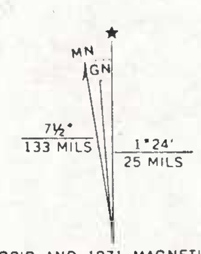
SCALE 1:24 000



CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

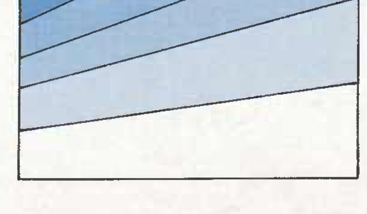
1983

QUADRANGLE LOCATION



UTM GRID AND 1971 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

Prepared by **Photo Science, Inc.**, Gaithersburg Maryland. Utilizing contour negatives, furnished by United States Geological Survey.



LOCATION OF WELLS AND SPRINGS by Mark T. Duigon

EXPLANATION

Information for some of the wells on this map (comprising an earlier inventory) is tabulated in the Maryland Geological Survey Basic Data Report No. 1 (Laughlin, 1966). Supplementary wells are tabulated in this atlas. The supplementary well information has been entered in the National Water Data Storage and Retrieval System (WATSTORE) of the U.S. Geological Survey and is available from the office of the USGS in Towson, Md.

Since 1945, the State of Maryland has required a permit to drill a water well. The numbers corresponding to the permit applications are included in the well-data tabulations. Since 1973, these numbers have appeared on metal tags affixed to the well casings. Much of the well data collected for this report is obtained from well-completion forms which the well driller must submit to the State upon completion of the well. Well drillers obtain discharge data by various methods, such as filling a bucket, using a flowmeter, or estimation.

Wells are identified by a State-wide numbering system. Each county is set up with a grid system based on every fifth minute of latitude and longitude. Each square of the grid is lettered by row and column. Thus, well BA-BC 056 is the 56th well inventoried in the second row from the north, third column from the west, in Baltimore County.

○118 WATER WELL AND NUMBER

○16 SPRINC AND NUMBER

REFERENCE

Laughlin, C. P., 1966, Records of wells and springs in Baltimore County, Maryland: Maryland Geological Survey Water Resources Basic Data Report No. 1, 406 p.

LOCAL NUMBER	STATE PERMIT NUMBER	OWNER	CONTRACTOR	DATE COMPLETED	ALTITUDE OF LAND SURFACE (FEET)	DEPTH OF WELL (FEET)	FINISH	DEPTH CASED (FEET)	CASING DIAMETER (INCHES)	PRINCIPAL AQUIFER	WATER LEVEL (FEET)	DRAW-DOWN (FEET)	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED	PUMPING PERIOD (HOURS)	SPECIFIC CAPACITY (GPM/FT)	USE OF WATER	USE OF SITE	TYPE OF LIFT
BA AC 86	BA-73-3097	HILTON, HOOPER B	W W REICHART	06/19/1976	810	200.00	X	23	6	300PRTB	30.00	190	6.0	06/19/1976	6.0	0.1	H	W	S
BA AC 87	BA-73-1202	WHIPPERMAN, HERMAN F	WM C JAMES	03/02/1974	770	115.00	X	20	6	300PRTB	40.00	25	5.0	03/02/1974	6.0	0.2	H	W	S
BA AC 88	BA-73-1045	STORCK, STEPHEN	EARL JONES	10/31/1973	740	160.00	X	20	6	300PRTB	35.00	145	16	10/31/1973	6.0	0.2	H	W	S
BA AC 89	BA-73-0856	BOHLAYER, MORRIS	WM C JAMES	08/03/1973	860	155.00	X	24	6	300PRTB	40.00	45	3.0	08/03/1973	6.0	0.1	H	W	S
BA AC 90	BA-73-0705	WHITTLE, FOREST	G EDGAR HARR	06/14/1973	750	200.00	X	62	6	300PRTB	35.00	155	5.0	06/14/1973	6.0	0.0	H	W	S
BA AC 91	BA-73-4248	ROMIG, WILLIAM	EARL JONES	04/14/1977	860	198.00	X	16	6	300PRTB	55.00	24	15	04/14/1977	6.0	0.6	H	W	S
BA AC 92	BA-73-4354	DUBIT, WILLIAM	W W REICHART	05/24/1977	890	200.00	X	39	6	300PRTB	40.00	15	9.0	05/24/1977	6.0	0.6	H	W	S
BA AC 93	BA-73-4749	KESTER, FRED	A C REIDER	09/20/1977	790	185.00	X	57	6	300PRTB	42.00	44	2.0	09/20/1977	6.0	0.0	H	W	S
BA AC 94	BA-73-4761	MT ZION METH CH	G EDGAR HARR	09/28/1977	810	200.00	X	63	6	300PRTB	50.00	125	1.0	09/28/1977	4.0	0.0	T	W	S
BA AC 95	BA-73-5408	BENNETT, WILLIAM	WM C JAMES	04/10/1978	800	100.00	X	48	6	300PRTB	30.00	70	10	04/10/1978	6.0	0.1	H	W	S
BA AC 96	BA-73-5038	ROYSTON, RONALD L	WM C JAMES	11/05/1977	845	125.00	X	21	6	300PRTB	40.00	18	10	11/05/1977	6.0	0.6	H	W	S
BA AC 97	BA-73-5815	SARRENTINO, PIETRO	W W REICHART	06/16/1978	780	225.00	X	40	6	300PRTB	50.00	130	3.0	06/16/1978	6.0	0.0	H	W	S
BA AC 98	BA-73-4423	GOSNELL, STEVE	LEONARD DRLG	08/20/1977	780	350.00	X	--	--	300PRTB		--	0.00	08/20/1977	--	0.0	--	Z	--
BA AC 99	BA-73-4423	GOSNELL, STEVE	LEONARD DRLG	08/20/1977	780	380.00	X	54	6	300PRTB	69.00	5	3.0	08/20/1977	6.0	0.6	H	W	S
BA AC 100	BA-73-0611	BULL, PAUL	EARL JONES	04/06/1973	800	180.00	X	20	6	300PRTB	48.00	102	5.0	04/06/1973	6.0	0.0	H	W	S
BA AC 101	BA-73-6270	CROOK, CHARLES H	A C REIDER	11/04/1978	770	220.00	X	78	6	300PRTB	33.00	70	2.0	11/04/1978	6.0	0.0	H	W	S
BA AC 102	BA-73-6269	RHEAN, JEROME	A C REIDER	11/04/1978	770	160.00	X	47	6	300PRTB	27.00	22	2.0	11/04/1978	6.0	0.1	H	W	S
BA AC 103	BA-73-3377	LAWSON, DAVID J	WM C JAMES	08/26/1976	760	195.00	X	41	6	300PRTB	47.00	96	4.0	08/26/1976	6.0	0.0	H	W	S
BA AC 104	BA-73-4103	WELDEN, RUSSELL J	W W REICHART	03/21/1977	830	200.00	X	37	6	300PRTB	40.00	40	6.0	03/21/1977	6.0	0.1	H	W	S
BA AC 105	BA-73-5603	NORWOOD, CARL	WM C JAMES	06/10/1978	810	200.00	--	--	--	300PRTB		--	0.00	06/10/1978	--	0.0	--	Z	--
BA AC 106	BA-73-4471	ARIFER, ASIM A	WM C JAMES	06/07/1977	820	150.00	X	59	6	300PRTB	50.00	12	3.0	06/07/1977	6.0	0.3	H	W	S
BA AC 107	BA-73-5603	NORWOOD, CARL	WM C JAMES	06/10/1978	810	245.00	X	61	6	300PRTB	60.00	5	2.0	06/10/1978	6.0	0.4	H	W	S
BA AC 108	BA-73-3374	BEDGAR, LIZZETTA	WM C JAMES	08/26/1976	790	100.00	X	55	6	300PRTB	50.00	4	5.0	08/26/1976	6.0	1.3	H	W	S
BA AC 109	BA-73-5539	CHER CHRIS CONS	G EDGAR HARR	04/11/1978	780	200.00	X	42	6	300PRTB	43.00	47	2.0	04/11/1978	6.0	0.0	H	W	S
BA AC 110	BA-73-5773	ENGLEHART, FRED	EARL JONES	10/30/1978	820	200.00	X	63	6	300PRTB	65.00	15	5.0	10/30/1978	6.0	0.3	H	W	S
BA AC 111	BA-73-3092	MOCK, WILLIAM	G EDGAR HARR	06/18/1976	770	165.00	X	38	6	300PRTB	36.00	4	5.0	06/18/1976	6.0	1.3	H	W	S
BA AC 112	BA-73-5513	YENDALL, KEITH L	MARYLAND DLG	04/28/1978	740	312.00	X	28	6	300PRTB	40.00	5	2.0	04/28/1978	6.0	0.4	H	W	S
BA AC 113	BA-73-6323	PAPESH, RUDOLPH	EARL JONES	12/14/1978	740	350.00	X	21	6	300PRTB	40.00	42	2.0	12/14/1978	6.0	0.0	H	W	S
BA AC 114	BA-73-0939	SMITH, JOHN A	WM C JAMES	09/04/1973	760	125.00	X	37	6	300PRTB	40.00	45	4.0	09/04/1973	6.0	0.1	H	W	S
BA AC 115	BA-73-1221	TRACEY, FLOYD	WM C JAMES	03/13/1974	840	110.00	X	22	6	300PRTB	30.00	35	5.0	03/13/1974	6.0	0.1	H	W	S
BA AC 116	BA-73-4192	KIDD, JACK H	WM C JAMES	05/16/1977	760	150.00	--	--	--	300PRTB		--	0.00	05/16/1977	--	0.0	--	Z	--
BA AC 117	BA-73-4192	KIDD, JACK H	WM C JAMES	05/16/1977	760	200.00	X	45	6	300PRTB	42.00	32	2.0	05/16/1977	6.0	0.1	H	W	S
BA AC 118	BA-73-4128	DANNUNZIO, VIRGIL J	WM C JAMES	05/19/1977	700	125.00	X	52	6	300PRTB	48.00	9	3.0	05/19/1977	6.0	0.3	H	W	S
BA AC 119	BA-73-4992	OCONNOR, JAMES	EARL JONES	11/01/1977	765	150.00	X	21	6	300PRTB	40.00	39	15	11/01/1977	6.0	0.4	H	W	S
BA AC 120	BA-73-4780	STEVENS, EMMET E	WM C JAMES	09/19/1977	770	125.00	X	22	6	300PRTB	51.00	27	12	09/19/1977	6.0	0.4	H	W	S
BA AC 121	BA-73-4375	BEHR, JOHN	EARL JONES	10/15/1977	760	250.00	X	21	6	300PRTB	50.00	42	2.0	10/15/1977	6.0	0.0	H	W	S
BA AC 122	BA-73-4254	ONEILL, JOE M	WM C JAMES	05/17/1977	760	175.00	X	20	6	300PRTB	65.00	30	2.0	05/17/1977	6.0	0.1	H	W	S
BA AC 123	BA-73-5179	CROOK, ROY	G EDGAR HARR	01/04/1978	810	150.00	X	63	6	300PRTB	77.00	21	8.0	01/04/1978	6.0	0.4	H	W	S
BA AC 124	BA-73-4739	EMGE, GEORGE	G EDGAR HARR	09/07/1977	810	300.00	X	52	6	300PRTB	52.00	115	6.0	09/07/1977	6.0	0.1	H	W	S
BA AC 125	BA-73-4019	GERWIG, CATHERINE J	WM C JAMES	03/10/1977	830	145.00	--	--	--	300PRTB		--	0.00	03/10/1977	--	0.0	--	Z	--
BA AC 126	BA-73-4019	GERWIG, CATHERINE J	WM C JAMES	03/10/1977	830	170.00	--	--	--	300PRTB		--	0.00	03/10/1977	--	0.0	--	Z	--
BA AC 127	BA-73-4019	GERWIG, CATHERINE J	WM C JAMES	03/10/1977	830	220.00	--	--	--	300PRTB		--	0.00	03/10/1977	--	0.0	--	Z	--
BA AC 128	BA-73-4019	GERWIG, CATHERINE J	WM C JAMES	03/10/1977	830	220.00	--	--	--	300PRTB		--	0.00	03/10/1977	--	0.0	--	Z	--
BA AC 129	BA-73-4019	GERWIG, CATHERINE J	WM C JAMES	03/10/1977	830	125.00	X	49	6	300PRTB	40.00	85	10	03/10/1977	1.0	0.1	H	W	S
BA AC 130	BA-73-3893	HAYES CONST	EARL JONES	02/18/1977	740	175.00	X	18	6	300PRTB	65.00	22	10	02/18/1977	6.0	0.5	H	W	S
BA AC 131	BA-73-4118	YEAGER, GERALD	WM C JAMES	05/09/1977	690	145.00	--	--	--	300PRTB		--	0.00	05/09/1977	--	0.0	--	Z	--
BA AC 132	BA-73-4118	YEAGER, GERALD	WM C JAMES	05/09/1977	690	145.00	X	51	6	300PRTB	50.00	11	4.0	05/09/1977	6.0	0.4	H	W	S
BA AC 133	BA-73-4419	MATRICCIAN, JOE	EARL JONES	05/24/1977	740	125.00	X	21	6	300PRTB	55.00	10	15	05/24/1977	6.0	1.5	H	W	S
BA AC 134	BA-73-4057	RICE, JAMES	A C REIDER	03/14/1977	740	245.00	X	55	6	300PRTB	66.00	131	2.0	03/14/1977	6.0	0.0	H	W	S
BA AC 135	BA-73-4425	FULLEM, CLARK D	A C REIDER	10/26/1977	770	125.00	X	63	6	300PRTB	66.00	6	2.0	10/26/1977	6.0	0.3	H	W	S
BA AC 136	BA-73-5006	HUGGINS, WILLIAM	EARL JONES	10/15/1977	760	250.00	X	21	6	300PRTB	68.00	94	5.0	10/15/1977	6.0	0.1	H	W	S
BA AC 137	BA-73-4683	FOREST BLDG INC	EARL JONES	07/16/1977	775	125.00	X	26	6	300PRTB	60.00	31	15	07/16/1977	6.0	0.5	H	W	S
BA AD 84	BA-73-2183	SPARKS ST BANK	WM C JAMES	06/20/1975	845	200.00	--	--	--	300PRTB	--	--	0.00	06/20/1975	--	0.0	--	Z	--
BA AD 85	BA-73-2183	SPARKS ST BANK	WM C JAMES	06/20/1975	845	200.00	X	55	6	300PRTB	50.00	24	2.0	06/20/1975	6.0	0.1	C	W	S
BA AD 86	BA-73-1243	MILLER, BARBARA A	WM C JAMES	03/21/1974	810	125.00	X	23	6	300PRTB	40.00	30	5.0	03/21/1974	6.0	0.2	H	W	S
BA AD 87	BA-73-5755	ZENGEL, CHARLES A	EARL JONES	07/06/1978	825	175.00	X	40	6	300PRTB	46.00	23	5.0	07/06/1978	6.0	0.2	H	W	S
BA AD 88	BA-73-3390	FELIX, KEITH	EARL JONES	09/15/1976	825	150.00	X	20	6	300PRTB	42.00	37	10	09/15/1976	6.0	0.3	H	W	S
BA AD 89	BA-73-3278	WADE, GEORGE W	WM C JAMES	08/02/1976	810	125.00	X	48	6	300PRTB	45.00	15	3.0	08/02/1976	6.0	0.2	H	W	S
BA AD 90	BA-73-4910	HUMPHREY, ROBERT W	WM C JAMES	11/03/1977	650	100.00	X	36	6	300PRTB	30.00	15	10	11/03/1977	6.0	0.7	H	W	S
BA AD 91	BA-73-4716	HARCOERODE, RICHARD L	A C REIDER	07/26/1977	720	260.00	X	28	6	300PRTB	37.00	150	2.0	07/26/1977	6.0	0.0	H	W	S
BA AD 92	BA-73-5219	BUSICK, CHARLES M	WM C JAMES	02/03/1978	780	200.00	X	74	6	300PRTB	45.00	51	2.0	02/03/1978	6.0	0.0	H	W	S
BA AD 93	BA-73-5737	BAFITIE, VILLIA	H J DILLON	06/08/1978	730	350.00	X	28	6	300PRTB	40.00	250	2.0	06/08/1978	6.0	0.0	H	W	S
BA AD 94	BA-73-5758	STACHURA, MELVIN	C C CAMPBELL	06/01/1978	725	245.00	X	40	6	300PRTB	45.00	23	3.0	06/01/1978	6.0	0.1	H	W	S
BA AD 95	BA-73-3636	SCHULTZ, FREDERICK	A C REIDER	12/14/1976	765	245.00	X	18	6	300PRTB	55.00	94	2.0	12/14/1976	6.0	0.0	H	W	S
BA AD 96	BA-73-4405	NASH, DONALD E	A C REIDER	07/14/1977	785	230.00	X	40	6	300PRTB	70.00	98	2.0	07/14/1977	6.0	0.0	H	W	S
BA AD 97	BA-73-5596	TIMBER CRAFT	EARL JONES	04/27/1978	750	500.00	--	--	--	300PRTB	0.00	--	0.00	04/27/1978	--	0.0	--	Z	--
BA AD 98	BA-73-5596	TIMBER CRAFT	EARL JONES	04/27/1978	750	250.00	--	--	--	300PRTB	--	--	0.00	04/27/1978	--	0.0	--	Z	--
BA AD 99	BA-73-5596	TIMBER CRAFT	EARL JONES	04/27/1978	750	150.00	--	--	--	300PRTB	--	--	0.00	04/27/1978	--	0.0	--	Z	--
BA AD 100	BA-73-5596	TIMBER CRAFT	EARL JONES	04/27/1978	750	500.00	X	20	6	300PRTB	42.00	238	3.0	04/27/1978	6.0	0.0	H	W	S
BA AD 101	BA-73-5323	HYBEK, JAMES	GURVIS JONES	04/14/1978	760	--	--	--	--	300PRTB	--	--	0.00	04/14/1978	--	0.0	--	Z	--
BA AD 102	BA-73-5323	HYBEK, JAMES	GURVIS JONES	04/14/1978	760	--	--	--	--	300PRTB	--	--	0.00	04/14/1978	--	0.0	--	Z	--
BA AD 103	BA-73-5323	HYBEK, JAMES	GURVIS JONES	04/14/1978	760	--	--	--	--	300PRTB	--	--	0.00	04/14/1978	--	0.0	--	Z	--
BA AD 104	BA-73-5323	HYBEK, JAMES	GURVIS JONES	04/14/1978	760	--	--	--	--	300PRTB	--	--	0.00	04/14/1978	--	0.0	--	Z	--
BA AD 105	BA-73-5323	HYBEK, JAMES	GURVIS JONES	04/14/1978	760	--	--	--	--	300PRTB	--	--	0.00	04/14/1978	--	0.0	--	Z	--
BA AD 106	BA-73-5323	HYBEK, JAMES	GURVIS JONES	04/14/1978	755	525.00	X	30	6	300PRTB	30.00	245	2.0	04/14/1978	6.0	0.0	H	W	S
BA AD 107	BA-73-4272	MARQUIS DEV INC	EARL JONES	06/06/1977	750	174.00	X	21	6	300PRTB	51.00	21	5.0	06/06/1977	6.0	0.2	H	W	S
BA AD 108	BA-73-4005	W S RUHL CORP	A C REIDER	02/03/1977	750	125.00	X	60	6	300PRTB	46.00	3	2.0	02/03/1977	6.0	0.7	H	W	S
BA AD 109	BA-73-3774	CADDIE HOMES	WM C JAMES	12/14/1976	750	175.00	X	33	6	300PRTB	50.00	20	2.0	12/14/1976	6.0	0.1	H	W	S
BA AD 110	BA-73-2458	TIRSCHMAN, FRANCIS R	WM C JAMES	10/24/1975	765	150.00	X	26	6	300PRTB	60.00	5	5.0	10/24/1975	6.0	1.0	H	W	S
BA AD 111	BA-73-3241	PHILLIPS, WILLIAM C	WM C JAMES	07/30/1976	730	150.00	--	--	--	300PRTB	--	--	0.00	07/30/1976	--	0.0	--	Z	--
BA AD 112	BA-73-3241	PHILLIPS, WILLIAM C	WM C JAMES	07/30/1976	730	175.00	--	--	--	300PRTB	--	--	0.00	07/30/1976	--	0.0	--	Z	--
BA AD 113	BA-73-3241	PHILLIPS, WILLIAM C	WM C JAMES	07/30/1976	730	150.00	--	--	--	300PRTB	--	--	0.00	07/30/1976	--	0.0	--	Z	--
BA AD 114	BA-73-3241	PHILLIPS, WILLIAM C	WM C JAMES	07/30/1976	730	200.00	X	51	6	300PRTB	50.00	15	2.0	07/30/1976	6.0	0.1	H	W	S
BA AD 115	BA-73-2463	FREY, HOWARD L	WM C JAMES	09/29/1975	730	172.00	--	--	--	300PRTB	--	--	0.00	09/29/1975	--	0.0	--	Z	--
BA AD 116	BA-73-2463	FREY, HOWARD L	WM C JAMES	09/29/1975	730	150.00	X	20	6	300PRTB	80.00	--	5.0	09/29/1975	6.0	--	H	W	S
BA AD 117	BA-73-2127	LEMCO INC	EARL JONES	05/21/1975	765	175.00	X	41	6	300PRTB	50.00	70	5.0	05/21/1975	6.0	0.1	H	W	S
BA AD 118	BA-73-2040	CRANSTON, EDWARD JR	WM C JAMES	05/10/1975	765	--	--	--	--	300PRTB	--	--	0.00	05/10/1975	--	0.0	--	Z	--
BA AD 119	BA-73-2040	CRANSTON, EDWARD JR	WM C JAMES	05/10/1975	765	125.00	X	19	6	300PRTB	60.00	11	3.0	05/10/1975	6.0	0.3	H	W	S
BA AD 120	BA-73-1942	STULLER, GORDAN T	A C REIDER	04/10/1975	685	278.00	X	55	6	300PRTB	53.00	132	2.0	04/10/1975	6.0	0.0	H	W	S
BA AD 121	BA-73-0843	HOCHSTEDT, EDWIN A	WM C JAMES	10/13/1973	750	140.00	X	24	6	300PRTB	50.00	70	6.0	10/13/1973	6.0	0.1	H	W	S
BA AD 122	BA-73-1238	SHIPMAN, FRED	EARL JONES	02/28/1974	765	300.00	--	--	--	300PRTB	--	--	0.00	02/28/1974	--	--	--	Z	--
BA AD 123	BA-73-1238	SHIPMAN, FRED	EARL JONES	02/28/1974	765	260.00	X	20	6	300PRTB	45.00	155	2.0	02/28/1974	6.0	0.0	H	W	S
BA AD 126	BA-73-4010	BULL, ALLAN B	WM C JAMES	02/15/1977	790	125.00	X	54	6	300PRTB	40.00	21	2.0	02/15/1977	6.0	0.1	H	W	S
BA AD 127	BA-73-4767	POWDER, JAMES R	WM C JAMES	08/31/1977	780	120.00	X	41	6	300PRTB	48.00	8	10	08/31/1977	6.0	1.3	H	W	S
BA AD 128	BA-73-4411	HOCHSTEDT, EDWIN A	WM C JAMES	06/18/1977	750	145.00	X	70	6	300PRTB	67.00	9	5.0	06/18/1977	6.0	0.6	H	W	S
BA AD 129	BA-73-4412	HOCHSTEDT, EDWIN A	WM C JAMES	06/20/1977	740	120.00	X	31	6	300PRTB	55.00	13	5.0	06/20/1977	6.0	0.4	H	W	S
BA AD 130	BA-73-4604	VORNHOLT, WILLIAM	WM C JAMES	08/25/1977	570	100.00	X	21	6	300PRTB	28.00	1	10	08/25/1977	6.0	10.0	H	W	S
BA AD 131	BA-73-4913	SHEMONSKI, ANTHONY	WM C JAMES	11/04/1977	650	125.00	X	27	6	300PRTB	35.00	5	4.0	11/04/1977	6.0	0.8	H	W	S
BA AD 132	BA-73-5142	WEBER, WILLIAM	G EDGAR HARR	11/25/1977	710	200.00	X	42	6	300PRTB	50.00	2	3.0	11/25/1977	6.0	1.5	H	W	S
BA AD 133	BA-73-4280	BURRS, CLAIR	WM C JAMES	07/26/1977	730	117.00	X	98	6	300PRTB	50.00	13	10	07/26/1977	6.0	0.8	H	W	S
BA AD 134	BA-73-4669	WACHTER, JOSEPH G	H J DILLON	08/01/1977	750	400.00	X	27	6	300PRTB	50.00	330	2.0	08/01/1977	6.0	0.0	H	W	S
BA AD 135	BA-73-4912	BELLMAN, HUBERT A	WM C JAMES	03/24/1978	630	200.00	X	52	6	300PRTB	51.00	21	2.0	03/24/1978	6.0	0.1	C	W	S
BA AD 136	BA-73-4145	HAGERMAN, PAUL W	WM C JAMES	04/07/1977	600	170.00	--	--	--	300PRTB		--	0.00	04/07/1977	--	0.0	--	Z	--
BA AD 137	BA-73-4145	HAGERMAN, PAUL W	WM C JAMES	04/07/1977	600	115.00	X	74	6	300PRTB	70.00	10	6.0	04/07/1977	6.0	0.6	H	W	S
BA AD 138	BA-73-4932	BULL, OSCAR	WM C JAMES	09/26/1977	780	125.00	X	73	6	300PRTB	40.00	85	15	09/26/1977	1.0	0.2	H	W	S
BA BC 196	BA-73-4282	FISHER, JOHN M	WM C JAMES	06/17/1977	700	145.00	X	39	6	300PRTB	52.00	7	2.0	06/17/1977	6.0	0.3	H	W	S
BA BC 197	BA-73-4282	FISHER, JOHN M	WM C JAMES	06/17/1977	700	275.00	--	--	--	300PRTB		--	0.00	06/17/1977	--	0.0	--	Z	--
BA BC 198	BA-73-3368	VERSAILLIE, ROY	G EAGAR HARR	12/09/1976	715	225.00	X	21	6	300PRTB	30.00	5	4.0	12/09/1976	6.0	0.8	H	W	S
BA BC 199	BA-73-1859	DEBUS, RONALD	D NELSON	01/02/1975	820	200.00	X	30	6	300PRTB	26.00	156	4.0	01/02/1975	6.0	0.0	H	W	S
BA BC 200	BA-73-0472	POWERS, RICHARD	A C REIDER	02/24/1973	780	200.00	X	45	6	300PRTB	46.00	152	2.0	02/24/1973	1.0	0.0	H	W	S
BA BC 201	BA-73-1214	SMITH, DENNIS G	WM C JAMES	03/14/1974	780	140.00	X	23	6	300PRTB	40.00	0	5.0	03/14/1974	6.0	5.0	H	W	S
BA BC 202	BA-73-1214	SMITH, DENNIS G	WM C JAMES	1974	780	200.00	X	--	--	300PRTB		--	0.00	03/14/1974	--	0.0	--	Z	--
BA BC 203	BA-73-1214	SMITH, DENNIS G	EARL JONES	03/14/1974	780	110.00	X	--	--	300PRTB		--	0.00	03/14/1974	--	0.0	--	Z	--
BA BC 204	--	CHER CHRIS CNST	G EAGAR HARR	03/01/1977	800	400.00	X	20	6	300PRTB	48.00	114	2.0	03/01/1977	6.0	0.0	H	W	S
BA BC 205	BA-73-3192	INGLES, RICHARD	WM C JAMES	07/16/1976	820	200.00	X	62	6	300PRTB	70.00	5	3.0	07/16/1976	6.0	0.6	H	W	S
BA BC 206	BA-73-2305	KERNS, JAMES L	A C REIDER	08/04/1975	730	173.00	X	44	6	300PRTB	42.00	123	2.0	08/04/1975	6.0	0.0	H	W	S
BA BC 207	BA-73-6123	SAPP, JOHN	EARL JONES	10/10/1978	690	400.00	X	60	6	300PRTB	49.00	30	2.0	10/10/1978	6.0	0.1	H	W	S
BA BC 208	BA-73-5796	WOJCIECHOW, EDWARD	EARL JONES	09/06/1978	820	350.00	X	40	6	300PRTB	47.00	121	2.0	09/06/1978	6.0	0.0	H	W	S
BA BC 209	BA-73-6195	MASONRY CNSTRCN	A C REIDER	11/22/1978	820	140.00	X	30	6	300PRTB	52.00	6	2.0	11/22/1978	6.0	0.3	H	W	S
BA BC 210	BA-73-2648	THOMPSON, EDWARD S	A C REIDER	01/06/1976	820	200.00	X	40	6	300PRTB	49.00	20	2.0	01/06/1976	6.0	0.1	H	W	S
BA BC 211	BA-73-4310	PEABODY, GLENN L	W W REICHART	05/27/1977	660	250.00	X	--	--	300PRTB		--	0.00	05/27/1977	--	0.0	--	Z	--
BA BC 212	BA-73-4310	PEABODY, GLENN L	W W REICHART	05/27/1977	660	--	X	--	--	300PRTB		--	0.00	05/27/1977	--	0.0	--	Z	--
BA BC 213	BA-73-4310	PEABODY, GLENN L	W W REICHART	05/27/1977	660	--	X	--	--	300PRTB		--	0.00	05/27/1977	--	0.0	--	Z	--
BA BC 214	BA-73-4310	PEABODY, GLENN L	W W REICHART	05/27/1977	660	425.00	X	41	6	300PRTB	63.00	210	2.0	05/27/1977	6.0	0.0	H	W	S
BA BC 226	BA-73-4461	BULL, JACOB A	W W REICHARD	06/28/1977	710	300.00	X	25	6	300PRTB	60.00	160	3.0	06/28/1977	6.0	0.0	H	W	S
BA BC 227	BA-73-3963	RYLAND HOMES	WATER INC	01/04/1978	700	202.00	X	70	6	300PRTB	65.00	15	3.0	01/04/1978	6.0	0.2	H	W	S
BA BC 228	BA-73-3947	RYLAND HOMES	WATER INC	03/06/1977	700	202.00	X	45	6	300PRTB	42.00	7	6.0	03/06/1977	6.0	0.9	H	W	S
BA BC 229	BA-73-3946	RYLAND HOMES	WATER INC	08/03/1977	700	127.00	X	40	6	300PRTB	35.00	15	6.0	08/03/1977	6.0	0.4	H	W	S
BA BC 230	BA-73-3924	RYLAND HOMES	WATER INC	02/25/1977	710	202.00	X	40	6	300PRTB	42.00	9	3.0	02/25/1977	6.0	0.3	H	W	S
BA BC 231	BA-73-4513	MADE, NORMAN	A C REIDER	08/18/1977	690	215.00	X	55	6	300PRTB	55.00	50	2.0	08/18/1977	6.0	0.0	H	W	S
BA BC 232	BA-73-4298	CHRIST, CHER	G EAGAR HARR	06/01/1977	810	200.00	X	30	6	300PRTB	54.00	2	8.0	06/01/1977	6.0	4.0	H	W	S
BA BC 233	BA-73-4037	MARCH, RONALD	A C REIDER	04/01/1977	620	300.00	X	20	6	300PRTB	50.00	80	2.0	04/01/1977	6.0	0.0	H	W	S
BA BC 234	BA-73-3942	RYLAND HOMES	WATER INC	09/20/1977	700	172.00	X	43	6	300PRTB	28.00	27	3.0	09/20/1977	6.0	0.1	H	W	S
BA BC 235	BA-73-3956	RYLAND HOMES	WATER INC	03/01/1978	740	210.00	X	44	6	300PRTB	40.00	25	3.0	03/01/1978	6.0	0.1	H	W	S
BA BC 236	BA-73-3934	RYLAND HOMES	WATER INC	08/04/1977	740	202.00	X	40	6	300PRTB	40.00	11	6.0	08/04/1977	6.0	0.5	H	W	S
BA BC 237	BA-73-4710	PALERMO, THOMAS J	WM C JAMES	08/19/1977	810	100.00	X	44	6	300PRTB	40.00	3	10	08/19/1977	6.0	3.3	H	W	S
BA BC 238	BA-73-3577	HOUGH, JAMES	WM C JAMES	09/24/1977	750	300.00	--	--	--	300PRTB		--	0.00	09/24/1977	--	0.0	--	Z	--
BA BC 239	BA-73-3577	HOUGH, JAMES	WM C JAMES	09/24/1977	760	245.00	--	--	--	300PRTB		--	0.00	09/24/1977	--	0.0	--	Z	--
BA BC 240	BA-73-3577	HOUGH, JAMES	WM C JAMES	09/24/1977	760	170.00	--	--	--	300PRTB		--	0.00	09/24/1977	--	0.0	--	Z	--
BA BC 241	BA-73-3577	HOUGH, JAMES	WM C JAMES	09/24/1977	760	145.00	--	--	--	300PRTB		--	0.00	09/24/1977	--	0.0	--	Z	--
BA BC 242	BA-73-4826	HOUGH, JAMES	WM C JAMES	09/24/1977	760	315.00	--	--	--	300PRTB	42.00	273	1.0	09/24/1977	1.0	0.0	H	W	S
BA BC 243	BA-73-5246	HOUGH, JAMES	EARL JONES	12/10/1977	760	550.00	X	--	--	300PRTB	105.00	445	1.0	12/10/1977	5.0	0.0	H	W	S
BA BC 244	BA-73-5156	HOUGH, JAMES	WM C JAMES	12/31/1977	760	200.00	--	--	--	300PRTB	0.00	--	0.00	12/31/1977	--	0.0	--	Z	--
BA BC 245	BA-73-5156	HOUGH, JAMES	WM C JAMES	12/31/1977	760	200.00	--	--	--	300PRTB		--	0.00	12/31/1977	--	0.0	--	Z	--
BA BC 246	BA-73-4154	SPENCER, GEORGE	WM C JAMES	04/01/1977	690	100.00	X	45	6	300PRTB	47.00	9	10	04/01/1977	6.0	1.1	H	W	S
BA BC 247	BA-73-4666	STEVENS, GERARD	WM C JAMES	09/17/1977	480	300.00	X	50	6	300PRTB	46.00	74	3.0	09/17/1977	6.0	0.0	H	W	S
BA BC 248	BA-73-4665	CAMPDIN, PAUL	WM C JAMES	08/15/1977	535	200.00	--	--	--	300PRTB		--	0.00	08/15/1977	--	0.0	--	Z	--
BA BC 249	BA-73-4665	CAMBDIN, PAUL	WM C JAMES	08/15/1977	535	145.00	--	--	--	300PRTB		--	0.00	08/15/1977	--	0.0	--	Z	--
BA BC 250	BA-73-4665	CAMBDIN, PAUL	WM C JAMES	08/15/1977	535	145.00	X	61	6	300PRTB	50.00	28	3.0	08/15/1977	6.0	0.1	H	W	S
BA BC 251	BA-73-4664	KUTPIK, MICHAEL J	WM C JAMES	08/15/1977	470	100.00	X	31	6	300PRTB	40.00	6	8.0	08/15/1977	6.0	1.3	H	W	S
BA BC 252	BA-73-4065	FAUGHEY, FRANK	A C REIDER	03/21/1977	815	140.00	X	25	6	300PRTB	23.00	6	2.0	03/25/1977	6.0	0.3	H	W	S
BA BC 253	BA-73-4306	WILSON, WILFORD J	WM C JAMES	05/18/1977	810	170.00	X	20	6	300PRTB	54.00	8	2.0	05/18/1977	6.0	0.3	H	W	S
BA BC 254	BA-73-3254	SHAEFER, CHARLES	W W REICHART	07/31/1976	740	300.00	X	41	6	300PRTB	45.00	185	5.0	07/31/1976	6.0	0.0	H	W	S
BA BC 255	BA-73-4373	HETT, JACK	DANA KYKER	06/27/1977	700	452.00	X	63	6	300PRTB	120.00	265	2.5	06/27/1977	6.0	0.0	H	W	S
BA BC 256	BA-73-3155	WILKE, DONALD	A C REIDER	07/17/1976	840	155.00	X	22	6	300PRTB	61.00	24	2.0	07/17/1976	6.0	0.1	H	W	S
BA BC 257	BA-73-5164	BOYCE, VERNON	LEONARD DRLG	04/01/1978	610	175.00	X	32	6	300PRTB	25.00	2	10	04/01/1978	6.0	5.0	H	W	S
BA BC 258	BA-73-5144	SPENCER, GEORGE E	WM C JAMES	11/22/1977	700	215.00	X	76	6	300PRTB	50.00	32	2.0	11/22/1977	6.0	0.1	H	W	S
BA BC 259	BA-73-4718	ESKRIDGE, CHARLES	A C REIDER	12/19/1977	625	190.00	X	113	6	300PRTB	55.00	65	3.0	12/19/1977	6.0	0.0	H	W	S
BA BC 260	BA-73-4982	NORTHWIND CONST	LEONARD DRG	10/25/1977	810	155.00	X	50	6	300PRTB	61.00	6	10	10/25/1977	6.0	1.7	H	W	S
BA BC 261	BA-73-4715	GRIEB, CHARLES E	WM C JAMES	07/29/1977	760	100.00	X	42	6	300PRTB	35.00	7	10	07/29/1977	6.0	1.4	H	W	S
BA BD 193	BA-73-6067	HARE, THOMAS	EARL JONES	09/18/1978	560	273.00	X	20	6	300PRTB	31.00	34	3.0	09/18/1978	6.0	0.1	H	W	S
BA BD 198	BA-73-6118	LEE, JAMES G	EARL JONES	09/15/1978	590	248.00	X	20	6	300PRTB	56.00	35	5.0	09/15/1978	6.0	0.1	H	W	S
BA BD 199	BA-73-2427	FORD, HERBERT P	WM C JAMES	10/30/1975	470	100.00	X	60	6	300PRTB	50.00	0	5.0	10/30/1975	6.0	5.0	H	W	S
BA BD 200	BA-73-3337	BORDERS, W D	WM C JAMES	08/13/1976	640	125.00	X	20	6	300PRTB	35.00	0	3.0	08/13/1976	6.0	3.0	N	W	S
BA BD 203	BA-73-4911	HELLMAN, HUBERT A	WM C JAMES	03/29/1978	625	100.00	X	34	6	300PRTB	20.00	80	10	03/29/1978	6.0	0.1	H	W	S
BA BD 204	BA-73-3972	BALTIMORE CO	L EASTERDAY	02/15/1977	580	180.00	X	29	6	300PRTB	30.00	150	20	02/15/1977	2.0	0.1	U	T	S
BA BD 205	BA-73-4676	HARRIS, JOHN	WM C JAMES	09/10/1977	640	240.00	X	54	6	300PRTB	50.00	190	3.0	09/10/1977	1.0	0.0	H	W	S

FINISH CODES

X OPEN HOLE

PRINCIPAL AQUIFER CODES

300PRTB PRETTYBOY SCHIST

WATER USE CODES

H DOMESTIC
T INSTITUTION
C COMMERCIAL
U UNUSED

SITE USE CODES

W WITHDRAWAL
Z DESTROYED
T TEST

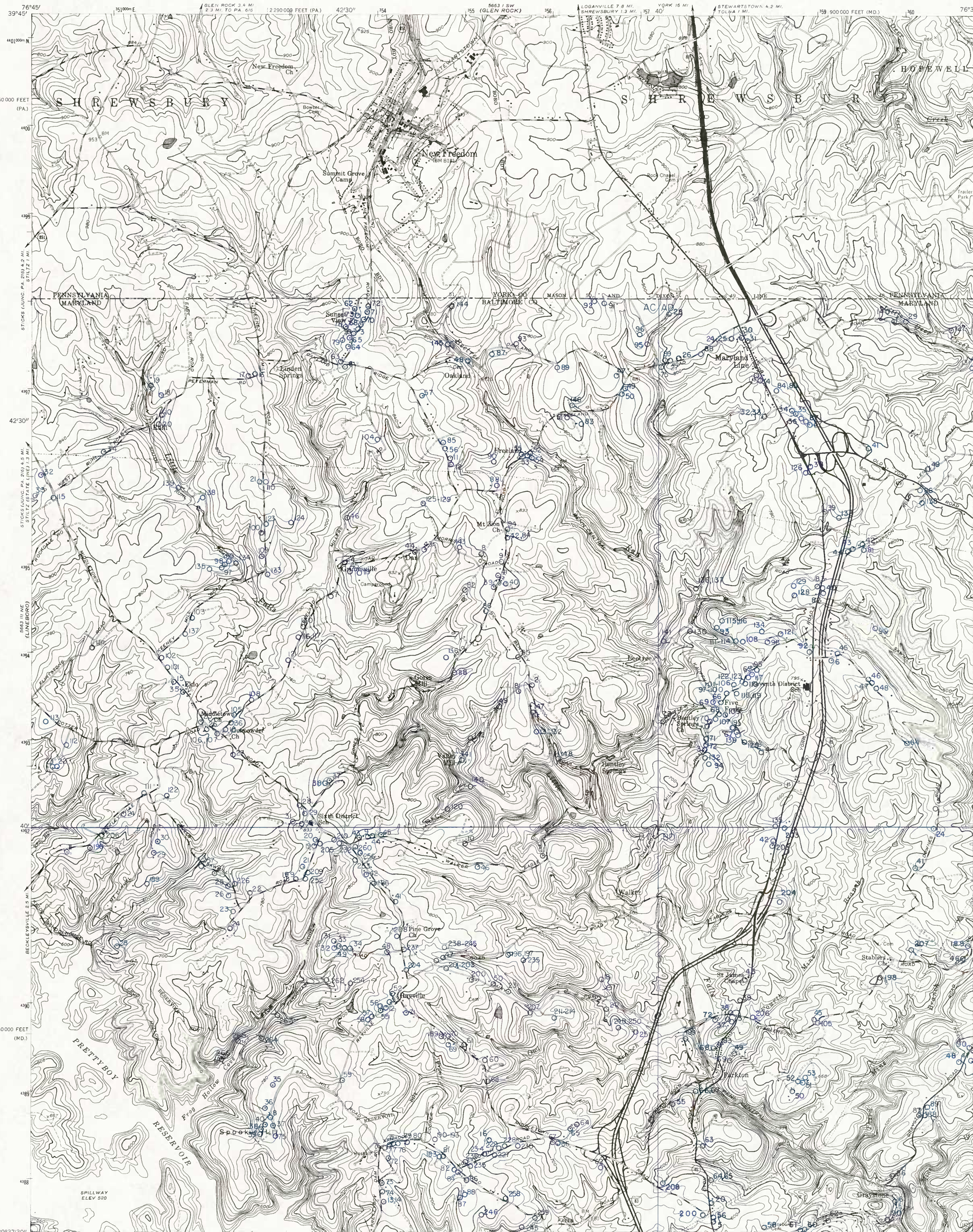
LIFT TYPE CODES

S SUBMERSIBLE

* See Map 3 (Depth to Water Table) for supplemental record of springs.

MAP 2. LOCATIONS OF WELLS AND SPRINGS

Maryland Geological Survey — Quadrangle Atlas No. 20



Topography from aerial photographs by photogrammetric methods 1944. Aerial photographs taken 1943. Culture revised by the Geological Survey 1958. Photorevised 1974.

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

1983

QUADRANGLE LOCATION

DEPTH TO THE WATER TABLE

By
Mark T. Duigon

EXPLANATION

This map shows the distance from the land surface to the water table (top of the zone of saturation). The map is based on well-drillers' completion reports supplemented by soils maps and observations of springs, swamps, and other natural features. The map shows that the water table is generally shallowest near streams, and deepest under summits of hills and ridges.

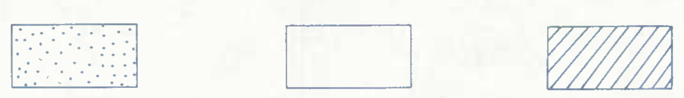
The position of the water table is not constant, but responds to various stresses, chiefly precipitation and evapotranspiration. The water table is usually highest during the early spring and lowest in late summer and early fall. Precipitation tends to raise the water table, but much of this water may be removed by evapotranspiration before reaching the zone of saturation. This removal of water is most notable during the growing season. Springflow may fluctuate with changes in the position of the water table. A spring that usually flows all year may cease to discharge during a prolonged drought, because the water table has declined to a point below the land surface. The map presented here is generalized, showing average depths to the water table.

Figure 1 shows a 19-year record of water levels in well BA-CE 21 measured periodically by the U.S. Geological Survey. This well, located near Jacksonville, Md., shows the seasonal variations that are characteristic of most water-table wells. It also shows variations in annual mean levels.

A discharging well produces a lowering of the water table (drawdown), but, in the Piedmont region, the effect is usually restricted to the immediate vicinity of the well, and as soon as the pump is shut off, the water level begins to return to its former level. The amount of drawdown varies considerably, depending on pumping rate, duration of pumping, and the hydrologic properties of the aquifer.

In some areas, rainwater infiltrating the ground encounters an impermeable barrier, saturating the material above the barrier, while the material below remains unsaturated. The surface of such a saturated zone is known as a perched water table. In the Piedmont, perched water tables are not as extensive as the main water table, and are usually temporary. They are not shown on this map.

APPROXIMATE DEPTH TO WATER TABLE BELOW LAND SURFACE



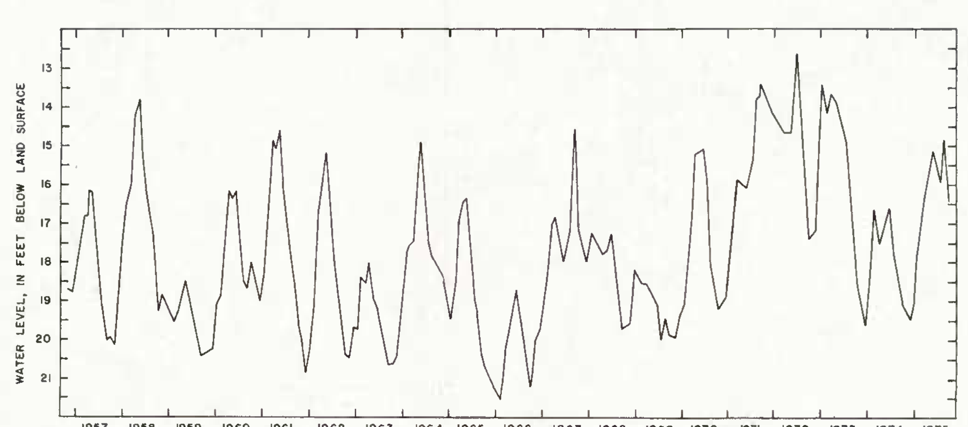


Figure 1.-- Hydrograph for well BA-CE 21.

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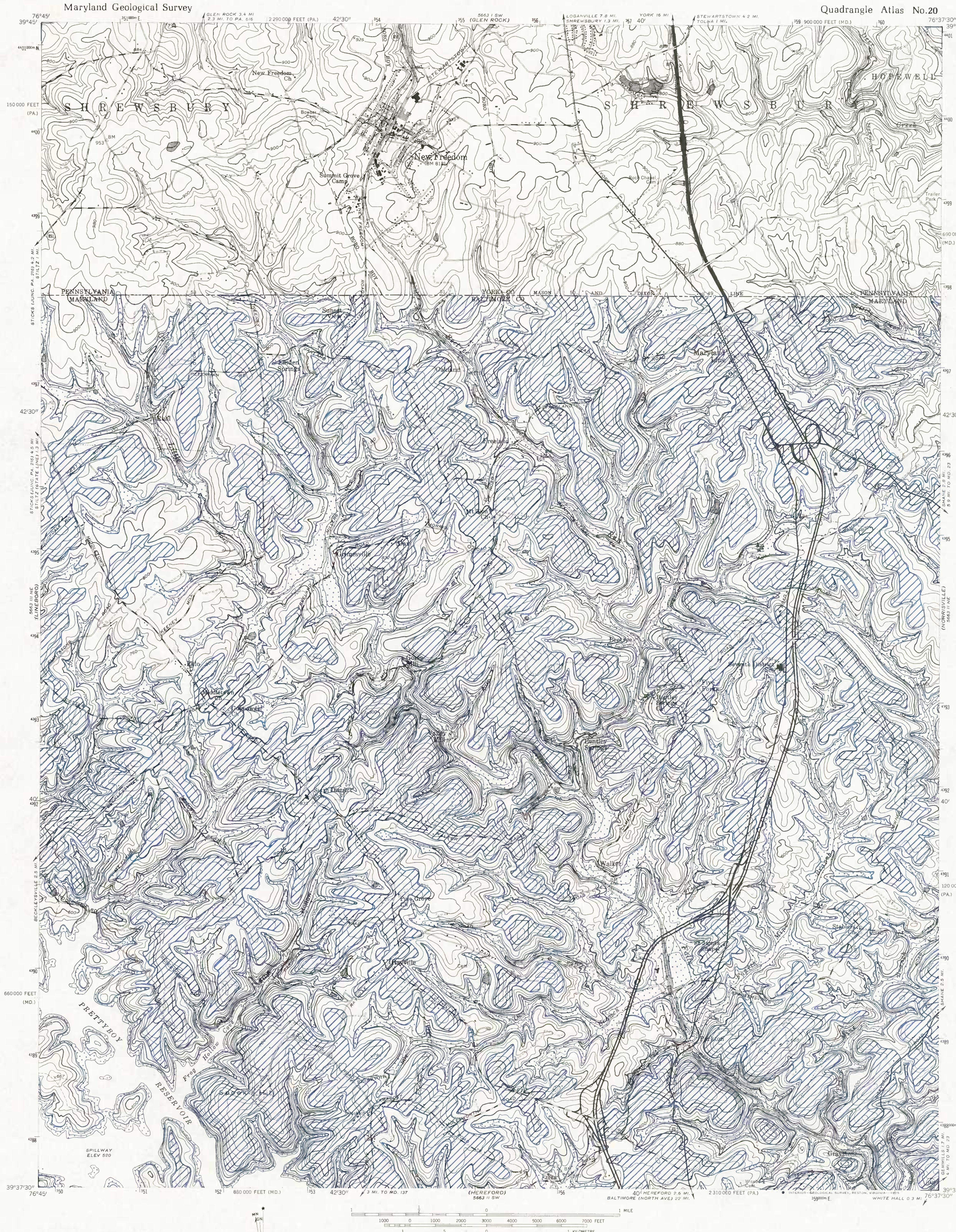
SUPPLEMENTAL RECORD OF SPRINGS IN THE NEW FREEDOM QUADRANGLE

NUMBER	OWNER	ALTITUDE (in feet)	TOPOGRAPHIC SETTING	AQUIFER	YIELD	DATE	USE OF WATER
BA-AC 138	-	715	hillside	300 Prettyboy Schist	5	04/06/1979	unused
BA-AC 139	-	730	hillside	300 Prettyboy Schist	2	04/06/1979	unused
BA-AC 140	Md. State Parks	540	valley flat	300 Prettyboy Schist	5	03/21/1979	unused
BA-AC 141	-	540	hillside	300 Prettyboy Schist	3	03/21/1979	unused
BA-AC 142	-	630	hillside	300 Prettyboy Schist	3	03/21/1979	unused
BA-AC 143	-	750	hillside	300 Prettyboy Schist	5	03/22/1979	unused
BA-AC 144	-	800	hillside	300 Prettyboy Schist	4	03/24/1979	unused
BA-AC 145	-	760	upland draw	300 Prettyboy Schist	2	03/24/1979	unused
BA-AC 146	-	780	hillside	300 Prettyboy Schist	2	03/24/1979	unused
BA-AC 147	-	690	hillside	300 Prettyboy Schist	5	03/23/1979	unused
BA-AC 148	-	590	hillside	300 Prettyboy Schist	2	03/24/1979	unused
BA-AC 149	-	680	hillside	300 Prettyboy Schist	5	03/21/1979	unused
BA-AD 139	-	690	hillside	300 Prettyboy Schist	2	03/26/1979	stock
BA-AD 140	-	700	hillside	300 Prettyboy Schist	2	03/26/1979	unused
BA-AD 141	-	580	hillside	300 Prettyboy Schist	1	03/26/1979	unused
BA-BC 262	-	680	hillside	300 Prettyboy Schist	1	04/05/1979	unused
BA-BC 263	Baltimore City	560	hillside	300 Prettyboy Schist	5	04/05/1979	unused
BA-BC 264	Baltimore City	570	hillside	300 Prettyboy Schist	7	04/05/1979	unused
BA-BC 265	Baltimore City	560	hillside	300 Prettyboy Schist	1	04/05/1979	unused
BA-BC 266	Baltimore City	560	hillside	300 Prettyboy Schist	1	04/05/1979	unused
BA-BD 206	-	460	upland draw	300 Prettyboy Schist	2	03/20/1979	unused
BA-BD 207	-	520	hillside	300 Prettyboy Schist	2	03/23/1979	unused
BA-BD 208	-	590	hillside	300 Prettyboy Schist	3	03/23/1979	stock

MAP 3. DEPTH TO WATER TABLE

Maryland Geological Survey

Quadrangle Atlas No. 20



Topography from aerial photographs by photogrammetric methods 1944. Aerial photographs taken 1943. Culture revised by the Geological Survey 1958. Photorevised 1974.

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

1983

QUADRANGLE LOCATION

AVAILABILITY OF GROUND WATER

by

Mark T. Duigon

NATURE OF OCCURRENCE

Ground water in the Piedmont province occurs chiefly in fractures in the crystalline metamorphic rocks, and in the pore spaces of the overlying, unconsolidated material. Intersecting fractures allow greater quantities of water to be removed. Fractures tend to become fewer in number and the voids formed by the fractures tend to become narrower with increased depth (LeGrand, 1954); consequently, the rate at which water can flow through the rocks, and the amount of water stored in the rocks decreases at greater depths. The optimum depth to drill a well also involves economic factors. Generally speaking, a domestic well in crystalline rock should be less than 250 ft deep (Davis and Turk, 1964). If a sufficient quantity of water is not obtained after drilling to this depth, the lower cost of drilling deeper rather than drilling elsewhere is offset by the lower probability of obtaining more water.

The water pumped from a well is commonly derived from storage in the overlying material (overburden) and transmitted through the rock fractures. The rocks themselves have little storage ability. The permeability and storage capacity, due to the network of fractures, controls the yield of a well.

The overburden provides renovation for downward-percolating water. Rock fractures have very little ability to renovate water. If contaminated water passes through an insufficient thickness of overburden, it can pass unpurified through the rock fractures and into a water-supply system.

Because a successful well must intersect water-bearing fractures, the selection of a well site should maximize the probability of drilling through fractures. Some rocks tend to fracture more readily than others; some rocks weather more readily, thereby enlarging existing fractures. The rocks underlying the New Freedom quadrangle area are relatively uniform schists (Prettyboy Schist, Pleasant Grove Schist, and Piney Run Formation; Crowley, 1976), so factors other than rock type affect well yield. Topography, in some cases, is related to major fracture zones, and can be readily assessed on a topographic map or in the field. Wells in valleys and draws generally have higher yields than wells on hilltops.

An analysis of linear features aids in selecting the optimum site for a well. In some places, these features, called lineaments, are related to zones of more intense fracturing. The features are identified by linear segments of stream channels, linear soil or vegetational tonal patterns, and alinement of some geologic features. They can be seen on topographic maps and aerial photographs, but need to be field-checked for verification. Although fractures can occur anywhere, the probability of drilling a well that will intersect at least one water-bearing fracture is increased by choosing a site suspected of being in a zone of greater fracture density.

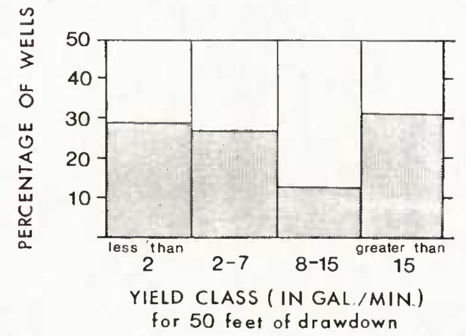


Figure 1.-- Distribution of well yields in the New Freedom quadrangle (121 wells).

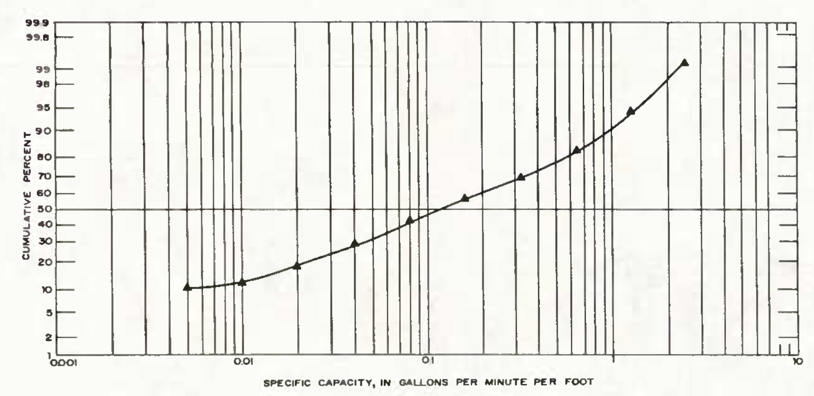


Figure 2.-- Cumulative distribution of well specific capacities in the New Freedom quadrangle (121 wells).

EXPLANATION

All of the New Freedom quadrangle is equivalent to what has been mapped as Geohydrologic Unit 3 in adjacent quadrangles. Although it is considered one unit, there is a good deal of variability in yield. Only wells pumped for 3 or more hours were used to derive the tabulated statistics. This time period was selected because specific capacity (discharge, in gal/min, divided by drawdown, in ft) decreases with duration of pumping, but at a rate that also decreases with time.

3

GEOHYDROLOGIC UNIT 3: This is the most widespread unit in Baltimore County and comprises the entire New Freedom quadrangle, where it is composed predominately of the Prettyboy Schist, with a small area of Pleasant Grove Schist and Piney Run Formation in the southeast corner. The following table summarizes the basic well statistics for the New Freedom quadrangle.

	Range	Median	Mean	Standard deviation
Reported yield (gal/min)	0-22	4	5.7	5.25
Specific capacity (gal/min)/ft drawdown	0.00-3.5	.10	.34	.528
Well depth (ft)	57-525	160	183	90.62

NUMBER OF WELLS: 121

Figure 1 shows distribution of well yields calculated from specific capacities. Figure 2 is a cumulative frequency curve for specific capacity of wells in the New Freedom quadrangle.

Lineaments

Well with reported yield less than 2 gal/min.

Well with reported yield greater than 15 gal/min.

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MAP 4. AVAILABILITY OF GROUND WATER

Maryland Geological Survey Quadrangle Atlas No. 20

Topography from aerial photographs by photogrammetric methods 1944. Aerial photographs taken 1943. Culture revised by the Geological Survey 1958. Photorevised 1974.

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

1983

MARYLAND
QUADRANGLE LOCATION

GEOHYDROLOGIC CONSTRAINTS ON SEPTIC SYSTEMS

By

Mark T. Duigon

INTRODUCTION

Where centralized sewage systems are not available, wastes from individual homes must be disposed of in comparatively small areas within a lot. These wastes are composed of many different substances including urine, fecal matter, laundry detergents and cleaning compounds, and food scraps--all transported out of the house as a slurry by mixing with large quantities of water. These substances must be reduced in quantity or deactivated; otherwise, harmful conditions may become established in the environment, particularly in the water-supply system.

The usual disposal method is to pipe the slurry into a septic tank where the liquid is separated from solids and greases, and partial decomposition of some of the waste material occurs. The effluent is then directed into a seepage pit or tile field for distribution into soil. As the effluent percolates downward toward the water table, the soil filters and absorbs most deleterious substances.

Careful construction and maintenance of disposal systems are essential. Although it is recognized that these systems have a limited life span, failure is often accelerated by negligent construction and lack of periodic maintenance. Systems operating according to principles different from those described above may be more effective, but if not maintained properly, they may lose their effectiveness and fail more readily than conventional systems. (See, for example, Warshall, 1979, p. 24-25).

CONSTRAINT FACTORS

1. Flood hazard: Disposal systems do not drain properly when flooded and may be physically damaged. Contamination of surface water is possible when flood waters mix with effluent, and can spread to ground-water supplies.

2. Shallow water table: If effluent enters the ground-water system before it has passed through enough soil for adequate renovation, it will contaminate the system. Baltimore County requires a separation of 4 ft from the base of the seepage system to the water table.

3. Depth to bedrock: Fractures in bedrock act as ground-water conduits, and renovation of effluent is not effective. Therefore, a sufficient thickness of unconsolidated material between the base of the seepage system and the bedrock surface is required.

4. Slope: Steep slopes generally have a thin soil cover and are likely to allow effluent to emerge at the surface. Baltimore and Carroll Counties allow a maximum slope of 25 percent. Sternberg (written commun., 1974) concluded that, where the slope exceeds 20 percent, effluent will come to the surface downslope from a drainfield regardless of soil type or depth of trenches. Slope categories for this map were obtained from Map 1.

5. Infiltration rate: This factor affects the design of the disposal system. If infiltration is too slow, drainage will be sluggish and effluent may back up through the plumbing system, or may appear at the surface due to flooding. If infiltration is too fast, renovation will be inadequate. In Maryland, the infiltration rate is evaluated at the site by a percolation test 1/.

Most of these factors are individually evaluated on a broad scale by the U.S. Department of Agriculture, Soil Conservation Service (Reybold and Matthews, 1976). These evaluations are tabulated, providing the values of certain soil properties for each soil mapping unit. The map presented here integrates those evaluations in addition to field observations by the author, other data in this atlas, and consideration of percolation tests by county officials. This map cannot substitute for onsite evaluations, as discussed in the section, Limitations of Maps.

1/ The percolation test in Baltimore County consists of digging at least two holes to bedrock or as deep as the backhoe will dig (about 16 ft). This is to determine if the water table or bedrock surface is high. A lateral extension of the first hole is dug to an approximate depth of 5 ft (initially), and, at the bottom, a 1x1x1-ft hole is hand-dug. This small hole is filled with water to a level of 7 in. above the base of the hole. The level is allowed to drop 1 in. and then is timed as it drops a second inch. The test is considered successful if the level takes from 2 to 30 minutes to drop the second inch. If the test fails, it is repeated at a greater depth or at another location. A proposed building lot must have a successful percolation test before a building permit will be issued, if sewage is to be disposed onsite. The testing health official also notes any other factors that may affect operation of the disposal system, such as impermeable layers.

MAP UNITS

UNIT I: Disposal facilities constructed in this unit face a high probability of failure. This unit generally occurs adjacent to streams and lakes, where the water table can be shallow and flooding can be a hazard. Other constraining factors are land slopes exceeding 25 percent and the presence of soils having low permeability (less than 0.63 in./hr, equivalent to greater than 95 min/in.). This unit includes soils developed on alluvium and subject to flooding, such as the Codorus silt loam and Hatboro silt loam. It also includes steep Manor soils and thin, stony Mt. Airy soils.

UNIT II: Conditions in this unit are not as severe as in Unit I, but they may work in combination to adversely affect disposal systems. Because of its variability and marginality, onsite evaluation is of particular importance. Major soils in this unit are Manor and Glenelg soils having moderate (15 to 25 percent) slopes. Also included are variable areas of scattered outcrops and stony soils, and land which has been modified and, hence, is highly variable. Depths to water table and bedrock vary; for example, depth to bedrock beneath Manor soils is reported to be from 3 1/2 to 10 ft.

UNIT III: Conditions in this unit are generally most favorable for installation of disposal systems. Onsite inspection is still required for characteristics of particular sites. The unit generally covers well-drained interfluvial areas dominated by Chester, Manor, and Clenelg soils having slopes less than 15 percent. Permeability varies (0.63 to 6.3 in./hr or 95 to 9.5 min/in.), but is generally adequate. The water table and bedrock are generally at depths greater than 10 ft from land surface.

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MAP 5. GEOHYDROLOGIC CONSTRAINTS ON SEPTIC SYSTEMS

Maryland Geological Survey Quadrangle Atlas No. 20

Topography from aerial photographs by photogrammetric methods 1944. Aerial photographs taken 1943. Culture revised by the Geological Survey 1958. Photorevised 1974.

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1983

STATE OF MARYLAND
DEPARTMENT OF NATURAL RESOURCES
MARYLAND GEOLOGICAL SURVEY
Kenneth N. Weaver, Director

HYDROGEOLOGIC ATLAS NO. 20
NEW FREEDOM QUADRANGLE, MARYLAND

By
Mark T. Duigon

INTRODUCTION

This atlas describes the hydrogeology of the New Freedom 7 1/2-minute quadrangle in northern Baltimore County, Maryland (fig. 1). The information contained herein is intended for use by planners, health officials, developers, environmental consultants, and anyone else concerned with baseline hydrogeologic data and the effects of hydrogeologic factors on development.

The climate of this area is humid temperate, with an average annual temperature of 52°F and an average annual precipitation of 44 in. (Vokes and Edwards, 1974, p. 20, 28).

The New Freedom quadrangle lies within the eastern division of the Piedmont physiographic province. The land surface is generally undulating, but some sections of stream valleys are deeply dissected. The drainage pattern shows some control by joints and fractures in the bedrock.

The entire Maryland portion of the area is drained by tributaries of Gunpowder Falls. A portion of Prettyboy Reservoir, formed by a dam on the Gunpowder Falls, is in the southwest corner of the area.

The northern portion, in Pennsylvania, drains into the Susquehanna River via several tributaries. These rivers ultimately empty into Chesapeake Bay.

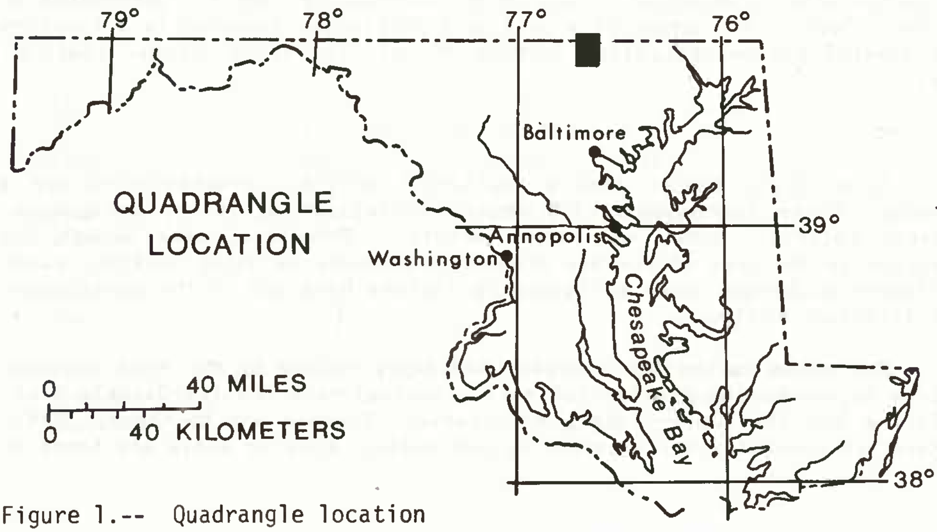

Figure 1.-- Quadrangle location

A permanent gaging station, located approximately 1 1/2 mi southeast of Graystone, monitors discharge from Little Falls, the major tributary in the New Freedom quadrangle area. Low-flow measurements have been conducted on Beetree Run at Bentley Springs.

Interstate 83 (Harrisburg, Pa., to Baltimore, Md.) runs north-south through the quadrangle area. It runs parallel to York Road (Md. Rte. 45), but allows much more rapid transportation. For this reason, residential development serving the needs of commuters working in the Baltimore area has been rapidly increasing in northern Baltimore County. Farming remains important; corn is the chief crop, and dairy products are also important.

GEOLOGY and SOILS

The stratigraphic nomenclature used in this report is that proposed by Crowley (1976) and does not necessarily follow the usage of the U.S. Geological Survey. The chief difference between this terminology and previous usage (Higgins, 1972) is the manner in which the Wissahickon Formation has been subdivided.

Prettyboy Schist underlies most of the mapped area, except for a band of Pleasant Grove Schist and a wedge of the garnet facies of the Loch Raven Schist in the southeast corner. These rocks are of early Paleozoic age. Fine-grained sediments derived from the southeast accumulated in a downwarping basin, and were deformed and faulted by powerful forces that moved large areas, or plates, of crustal rock. This activity, known as plate tectonics, generated enormous quantities of heat and pressure, resulting in a seemingly jumbled assortment of metamorphic rocks.

Later earth movements uplifted these rocks, exposing them to the mechanisms of weathering and erosion. These processes began in Mesozoic time and continue to this day; in fact, the development of agriculture has accelerated erosion in some areas.

The altered material formed at the surface of rock (or sediments) is known as soil. The nature of a soil at a particular location is a function of several parameters called factors of soil formation (Jenny, 1941, p. 16):

$$s = f\ (cl, o, r, p, t, \ldots)$$

This simply states that a particular soil's characteristics are a result of the interaction of climate, biological activity, topography, parent material, time, and other factors. Therefore, even though the bedrock in the area of the New Freedom quadrangle is quite uniform, minor differences in the other soil-forming factors have led to the development of different soils.

The soils in the New Freedom quadrangle belong to two soil associations (areas having distinctive soil patterns)--the Chester-Glenelg Association and the Manor-Glenelg Association (Reybold and Matthews, 1976). These are generally well-drained upland soils. Chester soils are found on hilltops and ridgetops. Manor and Glenelg soils more frequently have steeper slopes than Chester soils, and where adjacent to Chester soils, are found downslope. Minor soils, such as Baile, Glenville, Codorus, and Hatboro, are found in upland draws and flood plains. Other minor soils, found on ridgetops or upper slopes, include the Elioak and Mt. Airy series. Differences in these soils affect the success and suitability of certain land uses.

HYDROLOGY

Ground water, stored in the intergranular pore spaces of unconsolidated soil material (overburden), is transmitted through the crystalline rocks of the Piedmont by means of fractures. Most wells in the Piedmont are drilled through the overburden and into fresh rock. The amount of water produced by such a well depends, in part, on the number of fractures that the hole intersects, and the extent of the network of intersecting fractures. Figure 2 is a generalized Piedmont setting showing the hydrogeologic factors involved in well performance.

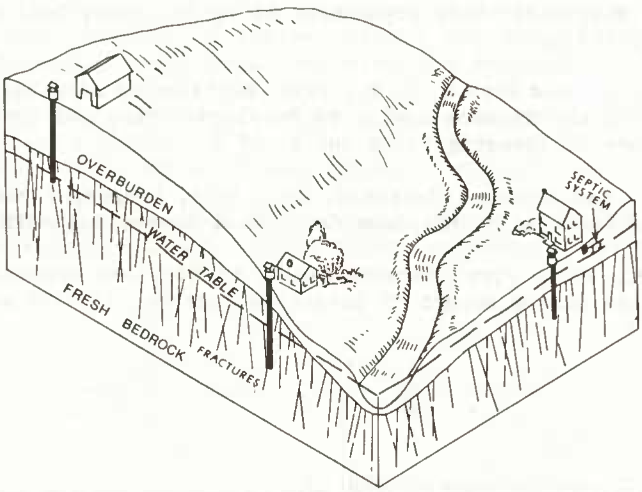

Figure 2.-- Wells in the Maryland Piedmont.

The generalized pattern of water circulation is known as the hydrologic cycle (fig. 3). The hydrologic cycle is the combination of "paths" that a quantity of water may move along as it is recycled through the earth and atmosphere. Water may be temporarily detained, but net losses or gains to the hydrologic cycle are negligible. A quantitative evaluation of the hydrologic cycle in a particular region can be made by use of the hydrologic budget:

$$P = R + ET + \Delta S$$

where

P = precipitation,

R = runoff,

ET = combined evaporation and transpiration, and

ΔS = change in storage.

Precipitation is the source of water in the Piedmont and is balanced by losses due to surface flow (runoff), release back into the atmosphere as water vapor (evapotranspiration), and changes (gain or loss) in the amount of water in storage in the ground.

Water quality is affected by the substances with which the water comes into contact. Ground water usually dissolves some of the minerals present in the rock and soil through which it passes. The intended use determines the suitability of water of a particular chemical nature: Water that is fit to drink may not be suitable for certain industrial applications such as steam boilers.

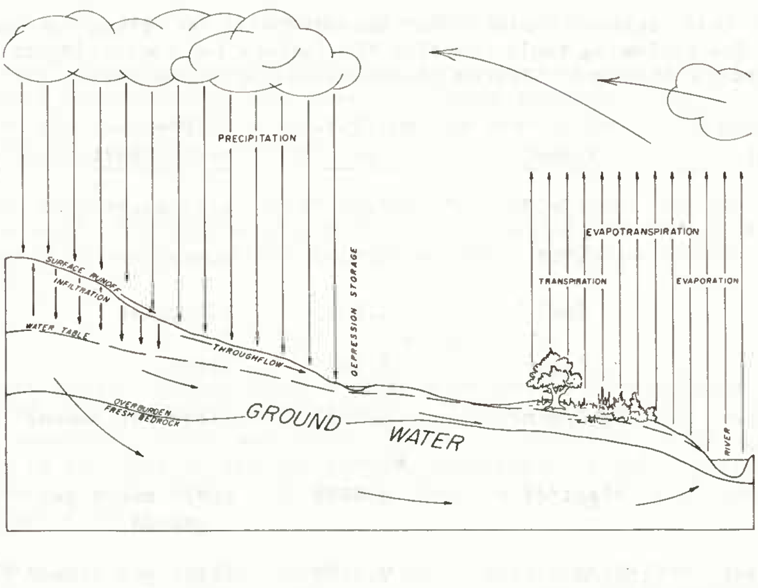

Figure 3.-- The hydrologic cycle.

MAPS INCLUDED IN THIS ATLAS

The information in this atlas is presented as five maps, each prepared on a standard 7 1/2-minute topographic quadrangle base.

1. Slope of the Land Surface, by Maryland Geological Survey.
2. Location of Wells and Springs, by Mark T. Duigon.
3. Depth to the Water Table, by Mark T. Duigon.
4. Availability of Ground Water, by Mark T. Duigon.
5. Geohydrologic Constraints on Septic Systems, by Mark T. Duigon.

LIMITATIONS OF MAPS

These maps are designed for broad planning purposes and are not intended to substitute for detailed onsite investigations where required. Boundaries may not be exact because of map scale, data quality, geographical distribution, and judgment required for interpolation.

CONVERSION OF MEASUREMENT UNITS

In this atlas, figures for measurements are given in inch-pound units. The following table contains the factors for converting these inch-pound units to metric (System International or SI) units:

Inch-pound Unit	Symbol	Multiply by	For Metric Unit	Symbol
inch	(in.)	25.40	millimeter	(mm)
foot	(ft)	0.3048	meter	(m)
mile	(mi)	1.609	kilometer	(km)
gallon	(gal)	3.785	liter	(L)
gallon per minute	(gal/min)	0.0631	liter per second	(L/s)
gallon per day	(gal/d)	0.0438	cubic meter per second	(m^3/s)
gallon per minute per foot	[(gal/min)/ft]	0.2070	liter per second per meter	[(L/s)/m]

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1/ The name of this agency was changed to the Maryland Geological Survey in June 1964.

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